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FAIRCHILD SEMICONDUCTOR CORPORATION

UNITED STATES DISTRICT COURT

FOR THE NORTHERN DISTRICT OF CALIFORNIA

SAN FRANCISCO DIVISION

ALPHA & OMEGA SEMICONDUCTOR, INC., a California corporation; and ALPHA & OMEGA SEMICONDUCTOR, LTD., a Bermuda corporation,

Plaintiffs and Counterdefendants,

v.

FAIRCHILD SEMICONDUCTOR CORP., a Delaware corporation,

Defendant and Counterclaimant.

AND RELATED COUNTERCLAIMS.

Case No. C 07-2638 JSW (EDL)
(Consolidated with Case No. C 07-2664 JSW)

FAIRCHILD'S REPLY CLAIM CONSTRUCTION BRIEF

Date: June 4, 2008
Time: 2:00 p.m.
Courtroom: Hon. Jeffrey S. White

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I. INTRODUCTION

Fairchild Semiconductor Corporation ("Fairchild") submits this reply to the responsive claim construction brief ("AOS Resp. Brief") of Alpha & Omega Semiconductor, Ltd., and Alpha & Omega Semiconductor, Inc., (collectively, "AOS"). AOS has taken a shotgun approach in its response, apparently hoping that at least one argument per claim term will hit its mark. However, Fairchild respectfully submits that incorrect arguments cannot hit a target, no matter how many are fired. In addition, while AOS takes issue with Fairchild's use of expert testimony in Fairchild's claim construction analysis, the issues presented are highly technical, and they require an understanding of the technology and the context in which the claim terms must be construed. Indeed, while expert testimony is extrinsic evidence, courts are encouraged to consider it when the issues are highly technical. *See Pitney Bowes, Inc. v. Hewlett-Packard Co.*, 182 F.3d 1298, 1309 (Fed. Cir. 1999) ("[I]t is entirely appropriate, perhaps even preferable, for a court to consult trustworthy extrinsic evidence to ensure that the claim construction it is tending to from the patent file is not inconsistent with clearly expressed, plainly apposite, and widely held understandings in the pertinent technical field. This is especially the case with respect to technical terms, as opposed to non-technical terms in general usage or terms of art in the claim-drafting art, such as "comprising." Indeed, a patent is both a technical and a legal document."); *Altiris, Inc. v. Symantec Corp.*, 318 F.3d 1363, 1369 (Fed. Cir. 2003) ("Courts may also review extrinsic evidence, always to assist them in comprehending the technology in accordance with the understanding of skilled artisans and as necessary for actual claim construction").

II. THE "MO" PATENTS

A. "wherein the heavy body forms an abrupt junction with the well"

Fairchild explained in its opening brief that the term "abrupt junction" means "the transition between the heavy body and the well occurs over a short distance relative to the depth of the well." This construction is based directly on the specification. (Jacobs Decl. [Docket No. 146], Ex. A ('481 patent), Fig. 5 & col. 7, lns. 18-38.) In response, AOS admits the patent specification defines "abrupt junction," but then attacks Fairchild's proposed construction. (AOS Resp. Brief at 4-10.) AOS then argues that because the prosecution history allegedly suggests a different definition of the term, the Court should ignore what is clearly stated in the specification. (*Id.*) As AOS notes, a patentee can act

as his or her own lexicographer. *Phillips v. AWH Corp.*, 415 F.3d 1303, 1316 (Fed. Cir. 2005). Fairchild's construction is proper because, in accordance with *Phillips*, it is taken directly from the specification and claim language.

AOS admits that the specification defines the term "abrupt junction" as being, among other things, a junction between a heavy body and a well ***having the same conductivity type***. (AOS Resp. Brief at 4; Declaration of Dr. Blanchard in Support of Fairchild's Reply Brief ("Blanchard Reply Decl."), ¶ 1.) Prior to the Fairchild patents, the term "abrupt junction" was typically used to refer to a type of junction between regions having different conductivity types. (*Id.* at ¶ 8.) The patent specification clearly teaches that the use of an abrupt junction between two regions having the same conductivity type is an important feature of the claimed invention. In contrast, AOS's proposed construction is based on a text authored by S.M. Sze, which describes an "abrupt junction" in an entirely different context – a junction between regions having ***different*** conductivity types. As described in more detail below, the Sze text was cited by the inventors during prosecution for a limited purpose – to illustrate the ***concept*** of an abrupt change between two regions. A person of ordinary skill in the art would understand the Sze definition does not apply to the claimed invention because the claims, like the description of "abrupt junction" in the specification, require the junction to be between regions having the same conductivity type. (*Id* at ¶ 8.)

AOS attacks Fairchild's proposed construction on the grounds that the transition distance of the abrupt junction should not be measured relative to the depth of the well. (AOS Resp. Brief at 8-9.) Yet a person of ordinary skill in the art would understand a point of reference is necessary because a transition can only be considered "short" ***relative to something else***. There needs to be a scale by which the length of the transition can be measured. Without scale, the transition may be short in one context but not in another. The depth of the well is the appropriate reference point because the transition occurs within the well, and the depth of the well defines the outer limit of the potential depth of the abrupt junction. (Blanchard Reply Decl., ¶ 4.)

AOS also argues that Fairchild has identified the wrong location for the transition between the heavy body and the well. (AOS Resp. Brief at 9-10.) AOS contends it is merely the steep gradient of the heavy body implant shown in the doping profile of Figure 5. (*Id.*) AOS's argument is inconsistent

with the specification and prosecution history and is technically illogical. (Blanchard Reply Decl., ¶¶ 5, 6.) An abrupt junction requires two things: first, the doping concentration gradient of the heavy body must be steep, and second that there be a ***change in the doping concentration gradient at the transition to the well.*** Contrary to AOS's argument, the intrinsic evidence teaches that the "junction" is located where the ***transition*** occurs between the heavy body and the well. (Blanchard Reply Decl., ¶ 6.) AOS's position cannot be correct because the portion of the dopant concentration profile AOS identifies as the "abrupt junction" – the steep slope – is not a junction at all, but rather is only part of the heavy body. (*Id.* at ¶ 6.) The prosecution history confirms this fact by describing the steep slope in Figure 5 as being a feature of the heavy body. (Jacobs Decl., Ex. G ('481 prosecution history, amendment dated September 5, 2000), at 8 ("the peak p+ heavy body is at a predetermined depth in the p-well and changes rapidly in a short further depth (i.e. has a steep doping concentration gradient)".)

AOS also incorrectly contends Fairchild's construction is indefinite because it "provides no objective measure of what constitutes an abrupt junction." (AOS Resp. Brief at 10.) However, the specification provides ample guidance. The specification discloses features of an "abrupt junction" in the context of the claimed invention, including processes that may be used to make one. (Blanchard Reply Decl., ¶ 7.) Persons skilled in the art would understand that junctions are typically abrupt or linearly graded. (*Id.*) Based on these teachings, a person of ordinary skill in the art would readily understand whether a junction is abrupt. (*Id.*) *See Xerox Corp. v. 3Com Corp.*, 458 F.3d 1310, 1323 (Fed. Cir. 2006) (reversing finding of indefiniteness where specification described examples "in the light of the difficulty of articulating a more exact standard for the concept").

AOS's proposed construction is also flawed because there is no support in the specification or prosecution histories that "further increasing the doping concentration gradient does not further reduce the breakdown voltage at the p-n junction between the well and the substrate." AOS has cited no basis for a requirement that breakdown voltage be reduced to a minimum at this location.

As noted above, AOS admits the "abrupt junction" in Sze is a junction between regions having ***different*** conductivity types (i.e., a P-N junction), not the same types as taught by the specification and required by the claims of the Fairchild patents. Sze was cited during prosecution for a limited

purpose; namely, to show the examiner that the term “abrupt junction” was well understood in the art. Both the examiner and any one else reading the prosecution history would know that the junction described in Sze was different in the sense that Sze’s abrupt junction was between regions of different conductivity type, while Mo’s abrupt junction was between areas of the same conductivity type. A person of ordinary skill in the art would understand the "abrupt junction" of Sze does not apply to the claimed invention.

During prosecution, the examiner rejected claims on the grounds that a cited reference allegedly disclosed an "abrupt junction" and other claim limitations. (Sun Decl. [Docket No. 155], Ex. 10 (Office Action dated December 5, 2000) at 3-4.) The claims were allowed after Fairchild pointed out that the reference did not disclose the claimed invention, and that others in the field had used the term previously ***in a different context*** (e.g., the P-N junction in Sze's text). (Sun Decl., Ex. 11 (Amendment dated June 7, 2001) at 5-10.) Thus, contrary to AOS's argument, Fairchild was not defining "abrupt junction" by citing Sze.

B. “resulting in avalanche current that is substantially uniformly distributed”

Fairchild explained in its opening brief that this term means "resulting in avalanche current that is approximately evenly distributed across the active region of the device." (Fairchild Opening Brief at 10.) The dispute between the parties relates to the area in which the avalanche current should be measured and whether the claim requires the measurement to occur at the instant the first electron enters the avalanche state. Fairchild explained that a person of ordinary skill in the art would understand the claim to require the avalanche current to be measured in the active region because each of the limitations of the claim relates to the active region of the device (i.e., where the transistor cells are formed). (*Id.* at 10-11; Blanchard Decl. [Docket No. 145], ¶¶ 40-45.) Fairchild further explained that there is nothing in the claim language requiring the current measurement to occur at a specific time, much less at the instant of breakdown initiation, as AOS urges. (Fairchild Opening Brief at 11-12.) Fairchild also explained it makes no technical sense to require measurement at the instant of breakdown initiation (even if this were possible), because the avalanche current at that instant in time is essentially ***a single point*** located in the active area. (Blanchard Decl., ¶ 45.)

In response, AOS argues the avalanche current must be measured across the entire device, not

simply in the active region. However, AOS ignores the fact that the entire body of the claim relates ***solely*** to the active region. AOS also ignores the fact that there is nothing in either the patent specification or its prosecution history which suggests the claimed invention was intended to uniformly distribute avalanche current across the entire device including both the "active" and "termination" regions. Instead, AOS asserts the claim relates to the entire device because the claim preamble refers to a "method of manufacturing a trench transistor." (AOS Resp. Brief at 11.) AOS neglects the large body of case law holding that a claim preamble does not define the scope of the invention absent unusual circumstances not applicable here. *See, e.g., Apple Computer, Inc. v. Articulate Systems, Inc.*, 234 F.3d 14, 22 (Fed. Cir. 2000). Furthermore, despite the introductory language of the preamble, the claim does not describe every component of a trench transistor.

AOS further argues that there is allegedly nothing in the claim which limits the location in which the avalanche current should be measured. (AOS Resp. Brief at 11.) But it would be improper to construe a claim based upon a ***lack*** of evidence, especially where the claim explicitly relates solely to the active region of the device. AOS also argues the claim must be interpreted to require measuring the avalanche current across the entire device because the specification describes an embodiment in which avalanche current is drawn into the termination region. (*Id.*) As discussed above, however, while other claims may refer to the termination region, the asserted claim has nothing to do with it. (Jacobs Decl., Ex. F ('111 patent), col. 9, lns. 5-7 & col. 10, lns. 34-36.)

As for the timing of the avalanche current measurement, AOS admits, as discussed in Fairchild's opening brief, that breakdown initiation occurs at a ***single point*** in the active area, which causes the avalanche current to form initially at that point before spreading rapidly throughout the active region. (Fairchild Opening Brief at 11-12.) AOS then proceeds to ignore its own assertion that breakdown initiates with a single electron at a single point, arguing that the avalanche current must be uniform at breakdown initiation. Without explaining this flawed logic, AOS argues in a *non-sequitur* that the specification and prosecution history sometimes refers to breakdown initiation, and this somehow requires that the timing of breakdown initiation is relevant to this claim. (AOS Resp. Brief at 12.) Yet the claim is not limited to the initiation of breakdown, and, in fact, does not use that term at all. The claimed invention therefore should not be limited in the way AOS suggests. *See Phillips,*

415 F.3d at 1323 ("For instance, although the specification often describes very specific embodiments of the invention, we have repeatedly warned against confining the claims to those embodiments.").

Finally, AOS argues its construction is required for the claim to make technical sense.[1] (AOS Resp. Brief at 13.) AOS asserts that measuring avalanche current at a time after breakdown initiation would permit any dopant profile to be used, in violation of the claimed requirement that the dopant profile be "adjusted." (*Id.*) This argument is meritless because the claim requires a relationship between the step of "adjusting a dopant profile" and the resulting avalanche current (Blanchard Reply Decl., ¶9; Jacobs Decl., Ex. F ('111 patent), col. 11, lns. 7-9.) Contrary to AOS's argument, this relationship limits the scope of the claim and does not vitiate the "adjusting" limitation, even if the uniformity of the avalanche current is measured subsequent to breakdown initiation. (Blanchard Reply Decl., ¶ 9.) Additionally, AOS attacks Fairchild's construction by raising a hypothetical scenario in which the peak electric field (breakdown) occurs ***at the trench***, not spaced away from it. (AOS Resp. Brief at 13.) This hypothetical misconstrues the claimed invention by ignoring the peak electric field limitation. The claim requires "adjusting" a dopant profile so that the peak electric field in a cell is ***spaced away from*** a trench. It also requires an avalanche current that is "substantially uniformly distributed" wherever it is located in the active region of the device. (Blanchard Decl., ¶ 43.) Thus, AOS's hypothetical is not relevant at all to the claimed invention.

C. "depth of the junction, relative to the depth of the well, is adjusted so that a transistor breakdown initiation point is spaced away from the trench in the semiconductor when voltage is applied to the transistor"

In its opening brief, Fairchild explained that this straightforward term needs no construction. The language unambiguously provides that the depth of the abruption junction is adjusted relative to the depth of the well so that a transistor breakdown initiation point is "spaced away from the trench" in the semiconductor when voltage is applied to the transistor. A person of ordinary skill in the art

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[1] Ironically, AOS's own arguments do not make sense. AOS asserts that avalanche breakdown occurs at the junction between the heavy body and well. (AOS Resp. Brief at 13.) But AOS contradicts this statement earlier in its brief, when it states that there is no avalanche breakdown at that junction. (*Id.* at 6, n.5.)

would understand that the ordinary meaning of this language should apply, including the meaning of "adjusted" and "spaced away," and thus construction by the Court is unnecessary. (Fairchild Opening Brief at 12-16.)

AOS incorrectly argues the term needs to be construed, and then supplies an unsupportable construction. First, AOS argues the claim requires the "adjusting" be performed by someone with the ***intent*** to affect the breakdown initiation point. (AOS Resp. Brief at 14-15.) AOS appears to contend the claim requires the "adjusting" be performed by someone with the specific goal of affecting the location of the breakdown initiation point. Based on AOS's interpretation, if the person did not have that subjective goal in mind, but the adjustment nevertheless caused the breakdown initiation point to be located in the area described in the claim, there would be no infringement.

This argument should be rejected as it is inconsistent with the plain language of the claims. The claims simply require the depth of the abrupt junction be adjusted "so that" the transistor initiation point be spaced away from the trench. As explained in Fairchild's opening brief, this means that the claim requires a causal relationship between the adjustment and the location of the breakdown initiation point. In other words, the term requires that an adjustment occur which, in part, achieves a specific result – the location of the breakdown initiation point being spaced away from the trench.

In making its argument, AOS misleadingly cites portions of the prosecution history in which Fairchild uses the word "purpose." (AOS Resp. Brief at 14-15.) AOS argues these uses of the word "purpose" demonstrate the claimed invention requires the "adjusting" be performed with a specific ***subjective*** intent. (*Id.*) AOS's position is without merit. The word "purpose" has at least two meanings. It may refer to a causal relationship (e.g., using a nightstick can cause injuries), or to a desired result (e.g., the policeman used the nightstick with the intent to injure the suspect). (Declaration of Eric Jacobs in Support of Fairchild's Reply Brief ("Jacobs Reply Decl."), Ex. M.) Each use of the word "purpose" in the prosecution history demonstrates that Fairchild was using the word in the former sense, to refer to the causal relationship between a selected depth and breakdown initiation (i.e., one result of the choice of depth).

AOS also attempts to support its position by citing cases for the proposition that claims may include an intent requirement. (AOS Opening Brief at 15.) Those cases are distinguishable from the

facts here, however, because the claims in the Fairchild patents do not include any words requiring someone to have a specific intent. Accordingly, the claims should not be construed to have that requirement. *See Intel Corp. v. U.S. Int'l Trade Comm'n*, 946 F.2d 821, 832 (Fed. Cir. 1991) (holding that in general there is no intent element to direct infringement).

AOS argues that "adjusting" should be limited to "selecting by repeated experiments or by computer simulation." (AOS Resp. Brief. at 15-16.) Fairchild explained in its opening brief that AOS's construction is inappropriately narrow because it permits only two ways in which "adjusting" may be performed. (Fairchild Opening Brief at 14.) AOS's sole basis for this limiting construction is that the specification allegedly describes methods of "adjusting" which are consistent with AOS's construction. AOS has not cited any support which would require the meaning of "adjusting" to be limited to the examples in the specification. Again, claims are not generally limited to the disclosed embodiments. *See Phillips* at 1323.

AOS argues that the requirement of moving the breakdown initiation point "away from the trench" should be interpreted to mean "toward the center of the body region of the device." (AOS Resp. Brief at 16-17.) Fairchild explained in its opening brief that AOS's construction is incorrect because the specification describes two different locations for breakdown initiation – away from the trench or at a central location between adjacent trenches (e.g., toward the heavy body). (Fairchild Opening Brief at 13.) Fairchild further explained that the ordinary meaning of the claim language and the doctrine of claim differentiation demonstrate that the claim covers the first location described in the specification – spaced away from the trench. (*Id.* at 13, 16.)

In response, AOS ignores the fact that the specification discloses the two different locations described above, and instead suggests that the specification only discloses one location for the breakdown initiation point. (AOS Resp. Brief at 16.) For the reasons discussed above, that is not correct. AOS misleadingly asserts that Dr. Blanchard's declaration supports AOS's construction because he describes the "claimed invention" as requiring the peak electric field to be centrally located beneath each heavy body region located between adjacent trenches. (*Id.*) Yet the cited portion of Dr. Blanchard's declaration relates to a ***different*** claim in a ***different*** patent which, unlike the claim at issue here, expressly requires the peak electric field to be spaced ***toward*** the heavy body, not simply

away from the trench. (Blanchard Decl., ¶ 42, at p. 17, lns. 21-22.)

AOS also argues the doctrine of claim differentiation does not apply. As explained in Fairchild's opening brief, the claim differentiation doctrine creates a presumption that independent and dependent claims differ in scope, and that a limitation generally should not be imported into the construction of an independent claim if that limitation is the only meaningful difference between the independent and dependent claims. (Fairchild Opening Brief at 16.) AOS asserts that the doctrine does not apply because the limitation it seeks to import into the independent claim, "toward the center of the body region between adjacent trenches," is allegedly different in scope than the limitation found in the dependent claim, "approximately halfway between adjacent gate-forming trenches." (AOS Resp. Brief at 17.) But AOS has cited no support for its argument that there is a meaningful difference between the limitations. In fact, they are virtually identical.

Finally, AOS argues incorrectly that Fairchild's interpretation reads the "adjusting" limitation out of the claim. (AOS Resp. Brief at 17.) Contrary to AOS's argument, Fairchild contends "adjusting" is a claim limitation that should be given its ordinary meaning (i.e., to change or to bring into a proper relationship). (Fairchild Opening Brief at 12; Blanchard Decl., ¶ 47.) This is a proper interpretation and does not result in the limitation being read out of the claim.

III. THE '947 PATENT

A. "acting as a field plate"

AOS incorrectly asserts that the structure acting as a field plate (the "conductive ring" under AOS's proposed construction) must be formed ***completely*** in a trench. According to AOS, the claims do not permit a structure that is outside of the trench to function as a field plate. (AOS Resp. Brief at 18-19.) Since AOS is asserting that a field plate is a structure that modifies the depletion regions in the underlying silicon substrate, AOS appears to be arguing that the only portion of the edge termination structure that can have any effect on depletion regions is the portion that is within the trench. There is no support in the claims, the specification, or the prosecution history for such a narrow construction.

AOS mistakenly argues that the claims specifically require this limitation, and in particular cites both claims 1 and 5 in support of its argument. (*Id*.) AOS cites the prosecution history of the

'947 patent as evidence that the '947 patent inventors amended the claims so as to require that the structure acting as a field plate be entirely within a trench. (*Id*. at 19, n. 12.) AOS also argues that the specification supports its interpretation of the claims. (*Id*. at 18-19.) Yet, neither the claims, nor the specification, nor the file history preclude any portion of the structure outside of the trench from acting as a field plate. Accordingly, the scope of the claims is broad enough to cover a termination structure in which the entire structure as a whole, not just the portion within the trench, contributes to increased breakdown voltage.

The claims and specification of the '947 patent recite a termination structure that integrates the gate runner, the contact, and the field plate into one structure. (Jacobs Decl., Ex. D, '947 patent at col. 2, lines 8-18; col. 4, lines 2-10 and 33-46; col. 5, lines 15-23; ; col. 6, lines 20-35; col. 7, lines 9-15; Figure 1.) This structure includes a portion that is located within a trench (i.e., conductive material 64) ***and*** a portion that is located outside of the trench (i.e., contact 68). (*Id.*) The '947 specification specifically states that the "second conductor portion," which is located in the termination region, includes ***both*** a contact and a feed. ('947 patent at col. 2, lines 8-18). To require that only one portion of this integrated structure may function as a field plate is inconsistent with the claim language and the disclosure of the patent. All that is required is that the integrated structure must perform the functions of both a gate runner and a field plate.

AOS's proposed construction is expressly contradicted by the language of claim 1. That claim recites, *inter alia*, a ***single conductor*** having a ***first conductor portion*** and a ***second conductor portion***. ('947 patent at col. 6, lines 20-35). The first conductor portion is formed in a trench in the active area, and consequently forms the gate of the transistor. (*Id.*) The second conductor portion is positioned in the termination region, and includes a ***contact*** and a ***feed***. (*Id.*) The structure of claim 1 makes clear that the second conductor portion (and not merely the "feed") acts as a field plate. (*Id.*) If the claim were to be construed as AOS suggests, i.e., if the "acting as a field plate" limitation were meant to apply only to the feed and not to the second conductor portion as a whole, then there would be a comma or nothing between the words "portion" and "and," rather than a semicolon. (*Id.*) The grammatical structure of the claim shows that the phrase "acting as a field plate" describes the second conductor portion and not just the feed. (*Id.*)

Furthermore, the prosecution history makes clear that the structure acting as a field plate need not be formed entirely within a trench. AOS argues in footnote 11 of its responsive brief that the patentees amended claim 1 to move the "acting as a field plate" limitation into the paragraph describing a feed. Contrary to AOS's argument, this so-called amendment never occurred. The "acting as a field plate" limitation was not part of the original claim 1 as filed. Rather, it was added to claim 1 in a Response to Office Action dated July 21, 2003. The limitation was added to overcome a rejection of the claim under 35 U.S.C. § 102 as being anticipated by U.S. Patent No. 5,998,833 (the "Baliga '833 patent"). The relevant portion of claim 1 appears in the July 21, 2003 office action response as follows:

a single conductor, configured for connection to a gate voltage supply, including first and second conductor portions with the first conductor portion positioned in the transistor region to control current flow through the source/drain formation and the second conductor portion positioned in the termination region, the second conductor portion ~~including~~:

including a contact for connection to the gate voltage supply; ~~and~~

including a feed comprising conductive material formed in a trench extending along the outer periphery and around the transistor region, said feed electrically connecting the contact with the first conductor portion~~.~~; and

acting as a field plate to extend the device breakdown voltage in the termination region.

(Wu Decl. [Docket No. 149], Ex. 23 at p. 2.) Thus, claim 1 as amended in the July 21, 2003 office action response was clearly written so that the phrase "acting as a field plate" described the second conductor portion, and not merely the feed.

AOS argues that claim 1 was subsequently amended in a December 29, 2003, Response to Office Action so as to move the phrase "acting as a field plate" into the paragraph describing the feed. The relevant portion of claim 1 appears in the December 29, 2003, office action response as follows:

a single conductor, configured for connection to a gate voltage supply, including first and second conductor portions with the first conductor portion **formed in a trench and being** positioned in the transistor region to control current flow through the source/drain formation and the second conductor portion positioned in the termination region, the second conductor portion:

including a contact for connection to the gate voltage supply; **and**

including a feed comprising conductive material formed in a trench extending along the outer periphery and around the transistor region, said feed electrically connecting the contact with the first conductor portion; and acting as a field plate to extend the device breakdown voltage in the termination region;

and

(Wu Decl., Ex. 24. at p. 2.) As can be seen, edits to claims are indicated by underlining (and by strike-through in other claims). Notably, there are no markings in the relevant portion of claim 1 indicating that the inventors intended to move the "acting as a field plate" limitation into the paragraph describing a feed. (*Id.*) It appears that the patentees' attorney accidentally failed to indent the "acting as a field plate" phrase, making it appear that it was a continuation of the preceding phrase. (*Id.*) If this was the intention of the patentees, however, it is striking that there are no markings to indicate the change, since all of the other changes to the claims had the appropriate markings as required by the rules under the Code of Federal Regulations and the corresponding chapters in the MPEP. (*Id.*)

It is also notable that the patentees arguments in the December 29, 2003, office action to distinguish amended claim 1 over the Baliga '833 patent had nothing to do with whether the second conductor portion, or merely the feed, acts as a field plate. (Wu Decl., Ex. 24. at pp. 9-11.) Rather, the arguments focused on a newly-added limitation directed to an "isolation trench," which the patentees asserted was absent in the Baliga '833 patent. (*Id.*) The patentees never mentioned moving the "acting as a feed" limitation to the previous paragraph describing the feed. (*Id.*) In fact, the patentees never mentioned the "acting as a feed" limitation at all in its remarks regarding the amendment. AOS's purported claim amendment, moving the "acting as a field plate" limitation to the paragraph describing the feed, in fact never happened. (*Id.* at pp. 9-15.) Moreover, even if the applicants had amended the claim language so as to move the "acting as a feed" limitation into the preceding paragraph, the limitation would still apply to the second conductor portion because the wording and grammar of both the "feed" limitation and the "acting as a field plate" limitation remained exactly the same.

Furthermore, the patent specification supports Fairchild's proposed construction. The problem addressed by the patent was to reduce the significant portion of die area that had to be devoted to prior edge termination designs for improving breakdown voltage. (Jacobs Decl., Ex. D, '947 patent at col. 1, lines 25-42.) The invention solved this problem by combining the gate runners and the field plate into one structure, thereby reducing the number of elements needed to make the device and increasing the usable area of the substrate. (*Id.* at col. 2, lines 37-48.) Whether or not the portion of the edge termination structure that acts as a field plate is located entirely within the trench or only partly within

a trench is irrelevant.

AOS also argues that the structure acting as a field plate must modify the depletion layer in the underlying silicon. Even if AOS were to show that a field plate inherently modifies the depletion layer, there is no justification for importing this additional requirement into the claim. AOS relies on the three publications that are recited in the Background of the invention which purportedly show that a field plate affects a device's depletion layer: Modern Power Devices (the "Baliga Text"); Semiconductor Power Devices (the "Ghandhi Text"); and U.S. Patent No. 5,233,215 (the "Baliga '215 patent"). Both the Baliga Text and the Ghandhi Text were cited in the '947 patent as describing known prior art edge termination designs. (Jacobs Decl., Ex. D, '947 patent at col. 1, lines 43-52.) They were not cited as providing a general treatise as to how all field plates operate, nor is there any basis for importing properties of field plates, as described in these references, as limitations on Fairchild's asserted claims. (*Id.*) The Baliga '215 patent, on the other hand, was not incorporated by reference and therefore has no bearing on the meaning of the '947 patent claims.

Furthermore, AOS fails to address the fact that the two textbooks describe only planar field plates. (Blanchard Decl. at ¶10; Wu Decl., Ex. 17 at pp. 63-70 and 298; Wu Decl., Ex. 19 at pp.116-119.) They do not describe field plates that are formed at least partially within a trench. (*Id.*) As explained by Dr. Blanchard in his declaration in support of Fairchild's opening claim construction brief, a trenched field plate affects depletion layers differently than a field plate that is formed entirely on the surface of the device. (*Id.*) Therefore, the two textbooks that AOS relies on provide no specific guidance as to how trenched field plates affect depletion regions. (*Id.*)

AOS's assertion that a field plate must be defined by its influence on the underlying silicon layer fails for an additional reason. AOS's proposed construction requires that only the portion of a structure that modifies the underlying silicon layer acts as a field plate. The problem with this concept of a field plate is twofold. First, it requires breaking up a single conductive structure into two parts, one part which acts as a field plate and one which doesn't. (Blanchard Decl. at ¶11.) Second, the size of the portion of a structure that actually affects the depletion layer changes depending upon the relative voltages applied to that structure and to the drain portion of the device. (*Id.*) Under AOS's proposed construction, a single structure may include a portion that acts as a field plate and another

that does not, depending upon the applied voltages. (*Id.*) Moreover, the boundary between these two portions will shift as the applied voltages vary. (*Id.*) So, for example, if there is a small difference in applied voltage to the field plate vis-à-vis the drain electrode, only a small portion of the field plate will affect the depletion layer. (*Id.*) If there is a large difference in applied voltage, on the other hand, a large portion of the field plate will affect the depletion layer. (*Id.*) For this reason, AOS's proposed construction would result in a definition of field plate having an ever-varying scope, depending upon the operating conditions of the accused product. (*Id.*) Such a proposed construction is impractical and should be rejected.

B. "elongated inner runners"

AOS argues that Fairchild's proposed construction seeks to construe "same" as including "different." (AOS Resp. Brief at 21-22.) AOS supports its argument by showing illustrations of open-cell and closed-cell designs. (*Id*. at 21.) AOS argues that an open-cell design includes gates running in a parallel direction, whereas a closed-cell design includes trenched gates running in two different parallel directions (i.e., perpendicular to each other). (*Id*.) AOS's argument is illogical and ignores basic principles of claim construction. The asserted claims of the '947 patent are written in classic open-ended form, using the word "comprising." A hundred years or more of claim construction precedent makes it clear that such open-ended claim language does not preclude the existence of additional structures. Thus, to satisfy the claim, a device only needs to have two (*i.e.*, "a plurality") of inner runners that extend in the "same direction." The claim does not mean, and Fairchild would not have to show, the absence of any other type of inner runner.

A closed-cell design, as illustrated by AOS, may include one set of inner gate gates running in one direction, and another set of gates running in a different direction. The presence of the second set of gates, which intersect the first set of gates, does not preclude the first set of gates from running in the same direction, and the converse is true. Even if "same direction" meant "one direction," for which there is no basis, the presence of the second set of gates is irrelevant to the issue of whether or not the first set of gates runs in the same direction. It is axiomatic that infringement cannot be avoided by simply ***adding*** features to an accused device which otherwise meets the claim limitations. *See, e.g., Northern Telecom Ltd. v. Samsung Electronics Co., Ltd.*, 215 F.3d 1281, 1296-97 (Fed. Cir.

2000) ("if a patent requires A, and the accused device or process uses A and B, infringement will be avoided only if the patent's definition of A excludes the possibility of B").

C. "isolation trench"

AOS argues that an isolation trench must have two sidewalls. Contrary to AOS's proposed construction, however, none of the definitions cited by AOS even use the term "sidewall" or "wall." With regard to Fairchild's argument that trenches are sometimes formed between adjacent die on a wafer and then cut through during the singulation process, AOS argues that device manufacturers do not cut through isolation trenches. AOS is simply wrong. Mesa devices, which have been known in the industry for many years, are fabricated on a wafer which is etched to form isolation trenches between adjacent devices. (Jacobs Reply Decl., Ex. N at pp. 262-265; Jacobs Reply Decl., Ex. O at pp. 32-35; Blanchard Decl. at ¶¶13-14.) The devices are singulated by cutting through the isolation trenches. (*Id.*) Moreover, AOS also asserts that an isolation trench must be filled with an insulating material. Such a requirement does not appear anywhere in the claims. Moreover, AOS has not cited any dictionary that requires a trench to be filled with anything in particular. Even if an isolation trench had to be filled with a dielectric (an insulator), as AOS asserts, such a limitation would be meaningless because air is a dielectric, as is the packaging material in which semiconductor devices are encapsulated. (Blanchard Decl. at ¶12.) For all these reasons, AOS's proposed construction should be rejected.

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Respectfully submitted,

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